AC 133-1A

DATE 10/16/79

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Washington, D.C.

FAR GUIDANCE MATERIAL

Subject: ROTORCRAFT EXTERNAL-LOAD OPERATIONS IN ACCORDANCE WITH FEDERAL AVIATION REGULATIONS PART 133

1. PURPOSE. This advisory circular (AC) provides information for persons interested in applying for a Rotorcraft External-Load Operator Certificate.

2. CANCELLATION. AC 133-1, dated July 15, 1977, is canceled.

3. RELATED FEDERAL AVIATION REGULATIONS (FAR).

a. Part 21 - Certification Procedures for Products and Parts.

b. Part 27 - Airworthiness Standards: Normal Category Rotorcraft.

c. Part 29 - Airworthiness Standards: Transport Category Rotorcraft.

d. Part 133 - Rotorcraft External-Load Operations.

4. BACKGROUND. In May 1977, Amendment 133-6 was announced in the Federal Register incorporating the following changes to Part 133:

a. Section 133.1, Applicability: "This Part prescribes--

"(a) Airworthiness certification rules for rotorcraft used in; and

"(b) Operating and certification rules governing the conduct of; nonpassenger-carrying civil rotorcraft external-load operations in the United States by any person (other than as an air carrier). However, this part does not apply to operations conducted under Part 375 of this Title."

b. Section 133.11, Certificate required.

"(a) No person subject to this part may conduct rotorcraft external-load operations within the United States without, or in violation of the terms of, a Rotorcraft External-Load Operator Certificate issued by the Administrator under Section 133.17."

Initiated by: AFO-820

c. Section 133.13, Duration of certificate, is discussed in paragraph 10 of this AC.

d. Section 133.19, Rotorcraft.

"(a) The applicant must have the exclusive use of at least one rotorcraft that-

"(1) Was type certificated under, and meets the requirements of, Part 27 or 29 of this chapter (but not necessarily with external-load-carrying attaching means installed), or in Section 21.25 of this chapter for the special purpose of rotorcraft external-load operations;"

5. APPLICATION INSTRUCTIONS. Application for a Rotorcraft External-Load Operator Certificate should be submitted in duplicate to the General Aviation District Office/Flight Standards District Office (GADO/FSDO) having jurisdiction over the area in which the applicant's principal business office is located. FAA Form 8710-4, Rotorcraft External-Load Operator Certificate Application, should be completed as illustrated in Appendix 1, page 1.

a. Signatures on FAA Form 8710-4 should be as follows:

(1) Application from a person acting as an individual should be signed by the owner;

(2) Application from the partnership should be signed by all partners;

(3) Application from a corporation should be signed by the president or such other officers as authorized by the corporate bylaws to sign for the corporation and certified by the corporate secretary attesting to the authority of the individuals to sign such a document; or

(4) Application from a company, club, or association should be signed by the president or such other officer or director as authorized by the organization's bylaws, and attested to by the secretary.

b. Rotorcraft. All Part 27 or 29 rotorcraft to be used should be listed on FAA Form 8710-4 as illustrated in Appendix 1, page 1.

Note: Restricted category rotorcraft need not be listed on the Rotorcraft External-Load Operator Certificate. (See paragraph 10f.)

c. Application for renewal or amendment of a Rotorcraft External-Load Operator Certificate should be completed in the same manner as for the original certificate except that it should be clearly identified as application for renewal or amendment, as the case may be.

6. CERTIFICATE FACSIMILE. Section 133.27(b) requires that a facsimile of the Rotorcraft External-Load Operating Certificate, FAA Form 8430-2 (Appendix 1,

page 2), be carried in each rotorcraft engaged in operations authorized by the certificate. The certificate holder may utilize any reasonable means to show compliance with this requirement. Only rotorcraft listed on the certificate as shown in Appendix 1, page 3 (except that, as mentioned on page 2, restricted category aircraft need not be listed), may be used under Part 133. A supplemental list of rotorcraft may be used as illustrated in Appendix 1, pages 3 and 4.

7. PILOTS. Section 133.31(d)(4) provides that a pilot engaging in external-load operations have in his/her personal possession, his/her logbook containing the appropriate load-class competency entry, or a Letter of Competency (Appendix 1, page 5), signed by the chief pilot or an FAA General Aviation Safety Inspector (Operations). For convenience, a Letter of Competency, the size of a pilot certificate, may be used in lieu of the pilot's logbook.

8. CONGESTED AREA OPERATIONS.

a. Section 133.31(f) establishes the requirements for conducting external-load operations over congested areas. Each operation is required to be conducted under a plan that must be approved by the GADO/FSDO having jurisdiction over the area in which the operation is to be conducted. It is not intended that a separate plan be required for each flight. One plan will suffice for an operation that might require several flights to complete. Each plan should provide sufficient information for a realistic evaluation to be made of all safety matters. A chart depicting flight routes and altitudes should be included in each operating plan. Aeronautical charts may be used if the scale and detail is sufficient for evaluation purposes. Past experience has shown that city maps distributed by oil companies are excellent for congested area operating plans. Lack of adequate charts may make it necessary to use a hand-drawn chart to identify routes over city streets, railroad tracks, riverbeds, etc. In order that each congested area operating plan may be properly evaluated, it should be submitted at least five working days in advance of the proposed operation to the appropriate office.

b. Section 133.45(e) states, "No person may conduct an external-load operation under this part with a rotorcraft type certificated in the restricted category under Section 21.25 of this chapter over a densely populated area, in a congested airway or near a busy airport where passenger transport operations are conducted."

c. The following considerations should be clearly understood by restricted category helicopter operators:

(1) During the development of FAR 133, it was necessary to consider the application of the congested area rules of Section 91.79 as they would apply to flight operations over congested areas. Specifically, it was necessary to provide an exception for congested area external-load operations and for external-load operations over other than congested areas. The first was accomplished in Section 133.31(f), which authorizes congested area operations under specified conditions for helicopters type certificated under Parts 27

or 29 (normal category and transport category). No provision is made in Section 133.31(f) for congested area external-load operations by rotorcraft certificated in the restricted category under Part 21. A restricted category (Part 21) helicopter is ineligible for use over congested areas during external-load operations. Secondly, Section 133.31(g) was designed to allow for external-load operations below those altitudes otherwise prohibited by Section 91.79(c) which do not create a hazard to persons or property on the surface. This rule is applicable to normal and restricted category helicopters alike.

(2) Section 91.39(d) prohibits the operation of restricted category aircraft over densely populated areas, in congested airways, or near a busy airport where passenger transport operations are conducted, except as authorized by an appropriate certificate of waiver. External-load operators are eligible for such waivers applicable to restricted category helicopters, as are the operators of any other restricted category aircraft. In the case of the external-load operator, such a waiver is applicable to all operations otherwise prohibited by Section 91.39(d), except when that operator is engaged directly in external-load operations. Section 133.45(e) reinforces the prohibition of Section 91.39(d) for external-load operations, and waiver provisions are not authorized.

(3) Access routes (ingress/egress) to the site of an external-load operation should not be construed to be a part of the external-load operation. Access to and from the worksite, not involving carriage of external load, should be considered a Part 91 operation.

(4) To review: A restricted category helicopter may not be used by an external-load operator for external-load operations over congested areas, over densely populated areas, in congested airways, or near busy airports where passenger transport operations are conducted.

9. DISCUSSION OF TERMS.

a. Congested Area. The term "congested area" has been applied on a case-by-case basis since it first appeared in the Air Commerce Regulations of 1926. No precise mathematical or geographic definition has yet been developed. The term has never been defined in any regulation. However, the following guidelines have been applied by the Civil Aeronautics Board (CAB) (now National Transportation Safety Board) in attempting to give the term fair and equitable effect:

(1) The term is administered so as to protect persons and property in small, sparsely settled communities, as well as persons and property in large metropolitan areas, from the hazards and from the noise of low flying aircraft. Thus, the size of the area is not controlling, and violations of the rule have been sustained for operation of aircraft: (i) over a small congested area consisting of approximately 10 houses and a school; (ii) over the campus of a university; (iii) over a beach area along a highway; and

(iv) over a boys camp where there were numerous people on the docks and children at play onshore.

(2) The presence of people is important to the determination of whether a particular area is "congested." Thus, no violation was found in the case of a flight over a large shop building and four one-family dwellings because, in the words of the CAB Examiner, "it was not known whether the dwellings were occupied." In that case, the area surrounding the buildings was open, flat, and semi-arid. For external-load operations, a factory with adjacent occupied parking lots, filled with employees and vehicles, might be considered a congested area unless the parking lots and employees are vacated and necessary precautions taken to prevent vehicles and persons from reentering the area.

(3) The term is administered to prohibit overflights that cut the corners of large, heavily congested, residential areas.

(4) As stated in FAR 91.79, the congested area could be any area of a city, town, or settlement. However, no precise density of population, ground traffic, or congestion, or precise description of the proximity of buildings or number of residences, has yet been devised that will achieve both the intended protection of persons and property on the ground, and fair application of the rule to operators of aircraft.

b. Densely Populated Areas. A densely populated area could be considered almost synonymous with a congested area. Those areas of a city, town, or settlement, which contain a large number of occupied homes, factories, stores, schools, university and hospital-type buildings, and other related business structures, might be considered densely populated areas. Additionally, a densely populated area may not contain any buildings, but could consist of a large gathering of persons, such as on a beach area, an airshow, a ball game, fairgrounds, etc.

c. Near a Busy Airport Where Passenger Transport Operations are Conducted. An external-load operation conducted within an airport traffic area could be considered "near" in the application of FAR 133.45(e). External-load operations cannot be conducted within such an area when passenger transport operations (air carrier and air taxi) are being conducted to or from those airports. Accordingly, the operator must be advised that advance coordination with the controlling air traffic control facilities will be necessary to ensure the establishment of proposed hours of external-load operation, and that adequate procedures will be utilized to ensure that no external-load operation is conducted when passenger transport operations to or from the airport are in progress. Passenger transport operations will be considered "in progress" whenever an aircraft engaged in such operations is in flight within the above defined areas, and the operator is so advised by air traffic control.

10. AIRWORTHINESS CERTIFICATION.

a. Part 133 prescribes airworthiness certification rules for rotorcraft used in nonpassenger-carrying rotorcraft external-load operations (other than an air carrier) in the United States. This part further provides that an applicant must have the exclusive use of a rotorcraft type certificated under Part 21 (Section 21.25), Part 27, or Part 29 (but not necessarily with external-load attaching means installed).

b. Under previous regulations, rotorcraft could not be operated with external loads for compensation or hire unless the rotorcraft-load combination has been approved under the provision of Parts 6 and 7 of the Civil Air Regulations (CAR) or in not for hire operations under Section 21.25(b). It was pointed out that the burden and expense of obtaining such approval may be unnecessarily severe and that safety would not be compromised if less restrictive airworthiness requirements were established.

c. Recognizing that the type certification rules prescribed in Parts 6 and 7 might be unduly restrictive when applied to rotorcraft with external-load provisions, Part 133 was adopted containing airworthiness standards for the approval of rotorcraft external-load operations and appropriate operating limitations for such rotorcraft. Part 133 requires an applicant to demonstrate satisfactory flight characteristics with various external-load combinations that are usually in addition to demonstrations required by Parts 27 and 29.

d. In addition, the external-load attaching means are appropriately certificated or a satisfactory demonstration must be performed in accordance with Sections 133.41 and 133.43 of the FAR. The flight demonstration should ensure that pilots are able to actuate the cargo quick-release device under simulated emergency conditions. Whenever the cargo quick-release switch location or function is modified, operators should ensure that their pilots redemonstrate their ability to actuate the switch in normal and simulated emergency operation without having to assume an unusual finger or thumb position. Having to assume an unusual finger or thumb position may induce unwanted control inputs.

e. Upon successful completion of all applicable requirements of Part 133, an applicant is eligible for a Rotorcraft External-Load Operator Certificate. This certificate becomes a current and valid airworthiness certificate for each standard category rotorcraft listed in that certificate when the rotorcraft is used in operations under Part 133 or in operations incidental to those operations.

f. Rotorcraft certificated in the restricted category for the special purpose of external-load operations under Section 21.25(b)(7) are issued Restricted Category Airworthiness Certificates. Therefore, the airworthiness status of such aircraft is determined by type certification, and there is no need to list such aircraft on the Rotorcraft External-Load, Category Operator Certificate.

11. ROTORCRAFT-LOAD COMBINATION FLIGHT MANUAL. Section 133.47 requires that a Rotorcraft-Load Combination Flight Manual be presented for approval. For the convenience of applicants, a sample manual is provided in Appendix 2. Depending upon the complexity of a particular operator's proposal, it may be necessary to provide more detailed guidelines than are shown in the sample manual.

KENNETH S. HUNT
Director of Flight Operations

Sample Forms

No certificate may be issued unless a completed application form has been received (14 C.F.R. 133).

Form Approved: OMB No. 04-R0132

DEPARTMENT OF TRANSPORTATION – FEDERAL AVIATION ADMINISTRATION

ROTORCRAFT EXTERNAL–LOAD OPERATOR CERTIFICATE APPLICATION

INSTRUCTIONS: Submit this form in triplicate to local FAA District Office

1. APPLICATION FOR (CHECK APPLICABLE BOX)	CERTIFICATE NO. *(For amendment or renewal only.)*	EXTERNAL – LOAD CLASS AUTHORIZATION(S)
[x] ORIGINAL ISSUANCE [ ] AMENDMENT [ ] RENEWAL		[x] A [x] B [ ] C

2. NAME AND ADDRESS OF APPLICANT	3. PRINCIPAL OR LOCAL BASE OF OPERATIONS *(Airport, City, and State)*
American Helicopters, Inc. 1001 Portsmouth Way Charleston, South Carolina	Charleston County Airport Charleston, South Carolina

4. NAME OF CHIEF PILOT OR PILOT IN CHARGE OF LOCAL OPERATION	AIRMAN CERTIFICATE	GRADE	NUMBER
Jane Q. Doe		Commer.	487578

5. ROTORCRAFT TO BE USED

REGISTRATION NUMBER	TYPE MAKE	TYPE MODEL	LOAD CLASS (√) A	B	C	ATTACH PREV. APPD. YES	DEVICE APPD. NO	REMARKS
N 1170	Bell	206	x	x			x	
N 4350	Sikorsky	58T	x	x	x	x		
N 4417	Sikorsky	61	x	x	x	x		

CERTIFICATION

I certify that the statements made on this application form and any attachments are true and correct, and that the operations indicated on this application will be conducted within the requirements of the Federal Aviation Act of 1958 and the applicable Federal Aviation Regulations.

DATE	TITLE OF AUTHORIZED OFFICER	SIGNATURE OF APPLICANT OR AUTHORIZED OFFICER
9/11/79	Vice-President Operations	Arthur T. Jones

FAA Form 8710-4 (6-77) SUPERSEDES FAA FORM 8420-7 AND FAA FORM 8000-32

Figure 1. Sample completed application for a Rotorcraft External-Load Operator Certificate.

THE UNITED STATES OF AMERICA

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

OPERATING CERTIFICATE

No. 999999

This certifies that AMERICAN HELICOPTERS, INC.
1001 PORTSMOUTH WAY
CHARLESTON, SOUTH CAROLINA

has met the requirements of the Federal Aviation Act of 1958, as amended, and the rules, regulations, and standards prescribed thereunder for the issuance of this certificate, and is hereby authorized to operate as

ROTORCRAFT EXTERNAL-LOAD OPERATOR

in accordance with said Act and the rules, regulations, and standards prescribed thereunder, and the terms, conditions, and limitations contained in the operations specifications.

This certificate is not transferable and, unless sooner surrendered, suspended or revoked, shall continue in effect

Effective date: AUGUST 15, 1979

By direction of the Administrator

Issued at: GENERAL AVIATION DISTRICT OFFICE NO. 11
FLIGHT STANDARDS BUILDING
CHARLESTON, SOUTH CAROLINA

Jane D. Smith
(Signature)

CHIEF
(Title)

APPROVED HELICOPTERS: N 1170, N 4350, & N 4417

FAA FORM 8430-2 (10-67) FORMERLY FAA FORM 1603

Figure 2. Sample Rotorcraft External-Load Operator Certificate.

THE UNITED STATES OF AMERICA

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

OPERATING CERTIFICATE

No. 999999

This certifies that AMERICAN HELICOPTERS, INC.
1001 PORTSMOUTH WAY
CHARLESTON, SOUTH CAROLINA

has met the requirements of the Federal Aviation Act of 1958, as amended, and the rules, regulations, and standards prescribed thereunder for the issuance of this certificate, and is hereby authorized to operate as

ROTORCRAFT EXTERNAL LOAD OPERATOR

in accordance with said Act and the rules, regulations, and standards prescribed thereunder, and the terms, conditions, and limitations contained in the operations specifications.

This certificate is not transferable and, unless sooner surrendered, suspended or revoked, shall continue in effect.

Effective date: AUGUST 15, 1979

By Direction of the Administrator

John Q. Smith
(Signature)

Issued at: GENERAL AVIATION DISTRICT OFFICE NO. 11
FLIGHT STANDARDS BUILDING
CHARLESTON, SOUTH CAROLINA

CHIEF
(Title)

VALID ONLY FOR HELICOPTERS SPECIFIED ON FAA APPROVED LIST ATTACHED

FAA FORM 8430-2 (10-67) FORMERLY FAA FORM 1603

Figure 3. Sample Rotorcraft External-Load Operator Certificate attaching list of approved helicopters.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591

September 1, 1979

Approved list of helicopters for use with American Helicopters, Inc. Rotorcraft External-Load Operator Certificate No. 999999 dated 9-15-79. This list must be attached to and is a part of Certificate No. 999999.

N 123	N 789 D
N 345	N 689 D
N 678	N 821 B
N 900	N 492
N 654	N 315
N 321	N 104
N 224	N 111
N 135	N 997

Jane Q. Smith
Chief, GADO 11
November 10, 1979

Figure 4. Sample additional list of approved helicopters.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591

August 15, 1979

Mr. John Q. Doe
112 12th Street
Midtown, Arkansas 56342

Dear Mr. Doe:

This is to certify that Mr. John Q. Doe, holder of Commercial/ATP pilot Certificate No. 487578, has on this date satisfactorily completed the knowledge and skill test required to act as pilot in command of helicopters with Class B/C external-loads.

He is qualified to serve as pilot in command in external-load operations conducted under External-Load Operator Certificate No. 999999 held by American Helicopters, Inc.

Sincerely,

(Signature and title of FAA Aviation
Safety Inspector (Operations) or Chief
Pilot designated in accordance with
Section 133.21(b))

Figure 5. Sample statement of competency letter.

SAMPLE MANUAL

ROTORCRAFT - LOAD COMBINATION

FLIGHT MANUAL

American Helicopters, Inc.
(NAME OF OPERATOR AS SHOWN ON CERTIFICATE)

Bell-206, Sikorsky-58T, 61
MAKE AND MODEL ROTORCRAFT

N 1170, N 4350, N 4417
REGISTRATION NUMBER

CLASS A, B, and C LOAD COMBINATION
(A,B, or C)

August 1, 1979
DATE

REVISED PAGES -)

Figure 1. Sample cover page.

CONTENTS

SECTION 1.

SECTION 2.

Figure 2. Sample contents page.

SECTION 1.

OPERATING LIMITATIONS.

In addition to the operating limitations set forth in the Approved Rotorcraft Flight Manual, this aircraft will be operated in accordance with the following operating limitations:

1. No person shall operate this aircraft with an external-load unless he/she holds an FAA External-Load Operator Certificate and has an entry in his/her logbook or a letter of competency as required by FAR 133.31(d)(3). He/she must have the logbook or a letter of competency in his/her personal possession during the operation.

2. No person who is not a required crewmember may be carried aboard the aircraft (unless he/she performs an essential function in connection with the external-load operation.) When the aircraft used requires a hoist operator, the air crewmember must at all times wear an approved hoist operator's safety harness.

3. Operations shall not be conducted over congested areas unless coordinated with the FAA District Office in accordance with a congested area plan developed in compliance with FAR 133.31(f)(1) and (2).

4. The total weight of this aircraft and load combination shall not exceed _____ pounds gross takeoff weight.

5. The location of the center of gravity for this aircraft and load combination shall be within the center of gravity range established during type certification under FAR Part 27 (formerly Civil Air Regulations Part 6) or special purpose certification of the aircraft.

6. The total weight of this aircraft and load combination shall not exceed _____ pounds.

7. This aircraft shall be operated within its limiting height/speed envelope, if any, but not to exceed _____ (kts. or m.p.h.). Extreme caution should be exercised when carrying external-loads, as controllability may be affected due to the size and shape of the cargo--OR--this aircraft shall be operated at a speed elected by the pilot, but not to exceed _____ (kts. or m.p.h.).

8. The external-load shall not exceed _____ pounds.

9. Other limitations deemed necessary by the operator.

Figure 3. Sample text pages.

SECTION 2.

LOAD COMBINATION INFORMATION:

1. Operator will list information pertaining to the peculiarities of the load combination, such as:

   a. Oscillating tendencies;
   b. Ground effect - in and out;
   c. Density altitude;
   d. Strong or gusty winds;
   e. Abrupt control movements; and
   f. Acceleration limitations.

2. Normal - inspect the cargo sling for proper installation and overall condition. Also check the load to make sure it is rigged properly and safely. Check the electrical release and the manual release on the ground before flight. Activate the circuit by pushing the cargo release circuit breaker IN. Position cargo release switch on panel to SAFE (off) when attaching cargo, then move switch to MANUAL or AUTO, as desired after cargo is attached and hook is locked.

   NOTE: When cargo release switch is positioned at AUTO, cargo can be released either by the electric manual switch or by touchdown; however, a minimum cargo weight of 125 pounds is required for automatic operation of the cargo hook. Lift cargo load to a hover and check the remaining power to determine if you have enough to safely carry the load. While hovering, verify that directional control is adequate. When moving into horizontal flight, use smooth, slow control movements to minimize settling and to prevent the load from swinging. In forward flight, check for hazardous oscillations of the external-load. When approaching a landing area with a critical load, come in slowly and start bringing in power early so as to allow for the lack of a good ground cushion to slow your descent.

3. In the event of electrical failure, use the manual release to drop the cargo load. If any difficulties arise during the flight and an emergency landing is necessary, release the load immediately. If for some reason the load will not release, use a full flare landing so as to eliminate dragging the load on the ground prior to touchdown as this will cause the aircraft to nose over with inadequate aft cyclic control to compensate. (It is suggested that cable hand cutters be carried as an emergency means of releasing the load in the event electrical and manual means fail.)

Figure 3--continued.

4. Information regarding static electricity discharges - Class B loads. Before attaching the cargo hook to the load, make sure the aircraft has been grounded so as to drain charges of static electricity that build up in flight.

5. Operator will list any other information essential for safe operation, such as:

   a. Precautions to avoid high-tension wires;
   b. Lightning (Class C loads);
   c. Standard hand signals - ground crew to pilot. (See page 11 of this manual);
   d. Crossing over main highways, etc;
   e. Delivering cargo (an example is given on this subject). Caution must be exercised when approaching the ground with any sling load to make sure that the helicopter is at a complete hover and the load touches down without being dragged across the ground. Motion at touchdown not only damages the load, but places high forces on the sling which can affect control of the helicopter when movement is excessive.

6. All personnel engaged in the external-load operation will be familiar with and use the signals on page 11 of this manual.

7. This rotorcraft has demonstrated its airworthiness in accordance with Sections 133.41 and 133.43 of FAR Part 133 and is approved for Class B rotorcraft-load combinations up to a maximum external-load of _____pounds.

   NOTE: This maximum load figure was derived using a 170-pound pilot weight and ____ gallons of gasoline. Allowances must be made for any changes in these factors.

8. Required placards.

   a. A placard for the maximum external-load will be marked on each side of the fuselage near the external-load hook.

   b. An instrument panel placard will be installed describing CLASS load approval.

9. Illustration of Standard Hand Signals.

Figure 3--continued.

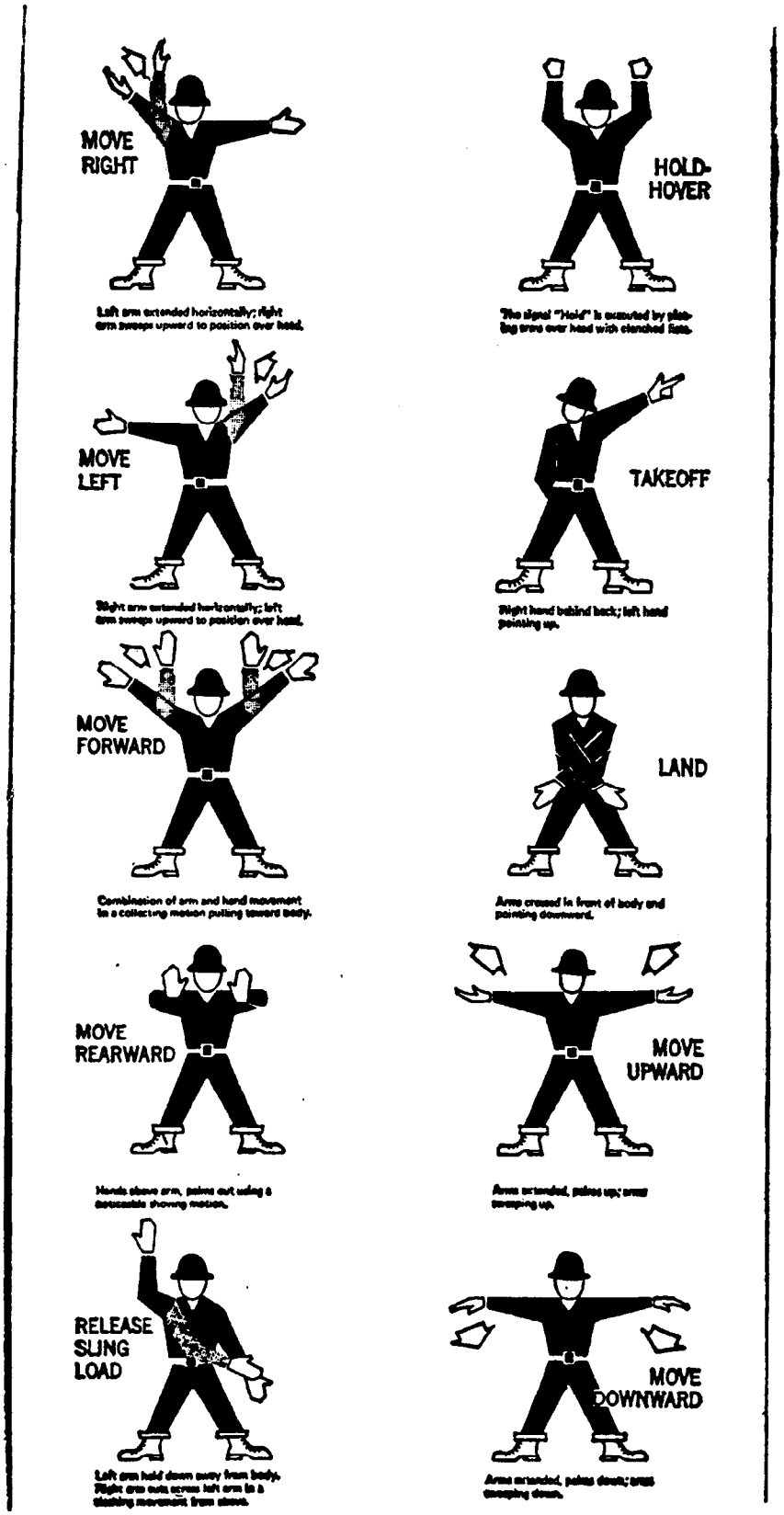

Figure 3--continued

10. After the helicopter has been directed into position, one ground crewmember should remain within sight of the pilot to direct with hand signals while two others attend to the cargo hookup. All hookups made to the helicopter while it is in a hover should be hastened to minimize the time the hookup personnel are required to spend underneath the helicopter. Whenever practical, the helicopter should be landed alongside the cargo for hookup. If a hookup is to be performed without the aid of a helicopter director, an air crewmember should lie prone on the floor and look downward from the main entrance doorway. From here, he/she can observe the actions of the ground crewmembers and direct the pilot on the interphone.

11. Hand signals. When giving hand signals to the pilot, a ground crewmember must stand in front of and to the right of the helicopter, in sight of the pilot. Appendix 2, page 6, illustrates standard hand signals that may be used for day or night operations.

> The operating limitations as set forth in Section 1 and the load combination information contained in Section 2 are the conditions under which I will conduct this rotorcraft external-load combination operation.

_____

(Operator's signature)

Figure 3--continued.

* U. S. GOVERNMENT PRINTING OFFICE : 1979 311-586/282